

# Tobamovirus Expression Vectors

## TMV



## TMV-Expression Vector

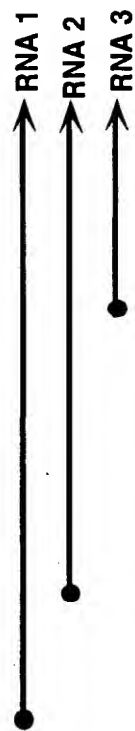


FIG. 1

# Tobamovirus Vector for rGal-A

## Expression

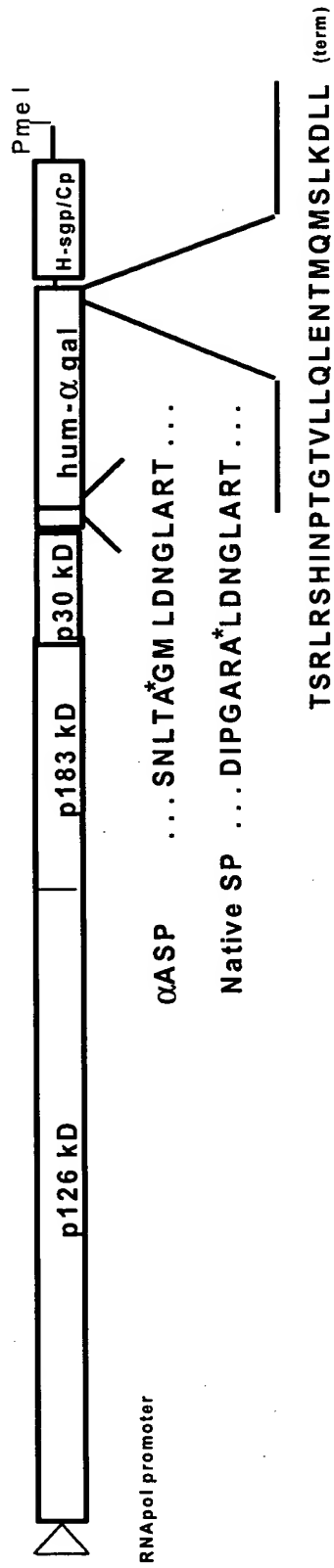
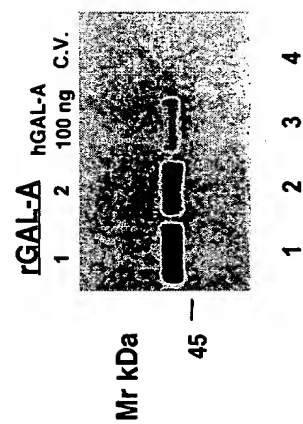


FIG. 2

# Accumulation and Activity of WT rGal-A

A.



Western Analysis  
total plant soluble extract  
anti human GAL-A sera

B.

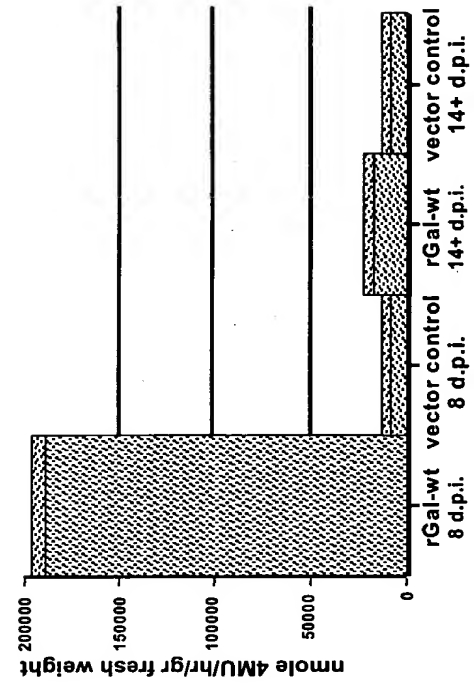


FIG. 3

IF Homogenate

FIG. 4



FIG. 6

FIG. 7

**Coomassie Stain - IF**

Mr kDa

200  
116  
97  
66  
45  
31  
21.5  
14.4  
6.5

M C.V. C.V. 4 4R 4R 4R 4R 4R 4R HGAL-A

1 2 3 4 5 6 7 8 9 10

**FIG. 8**



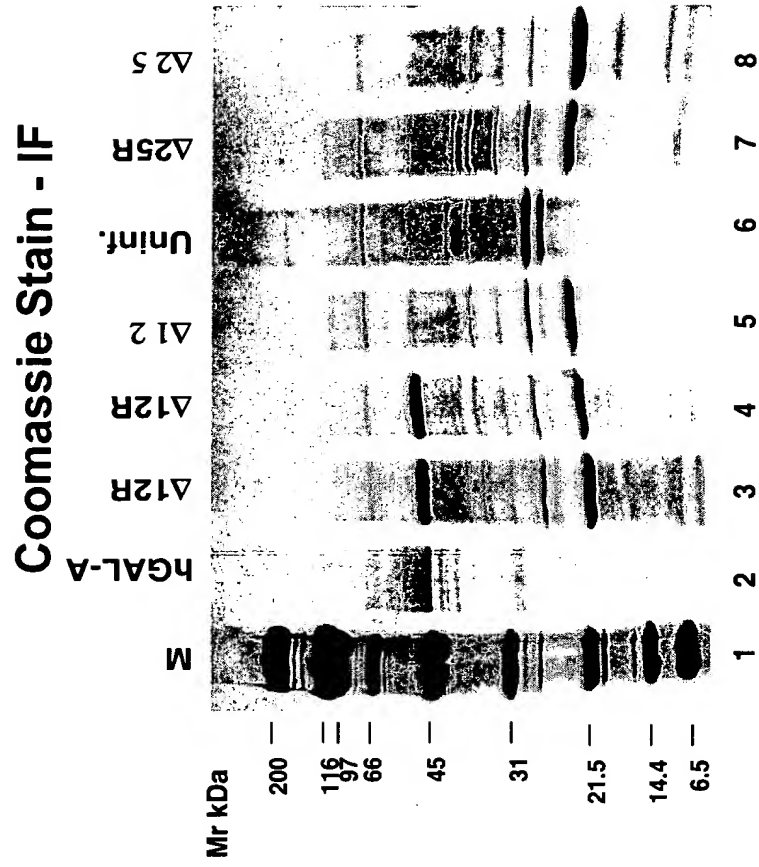


FIG. 9

# Schematic of rGal-A Secretion

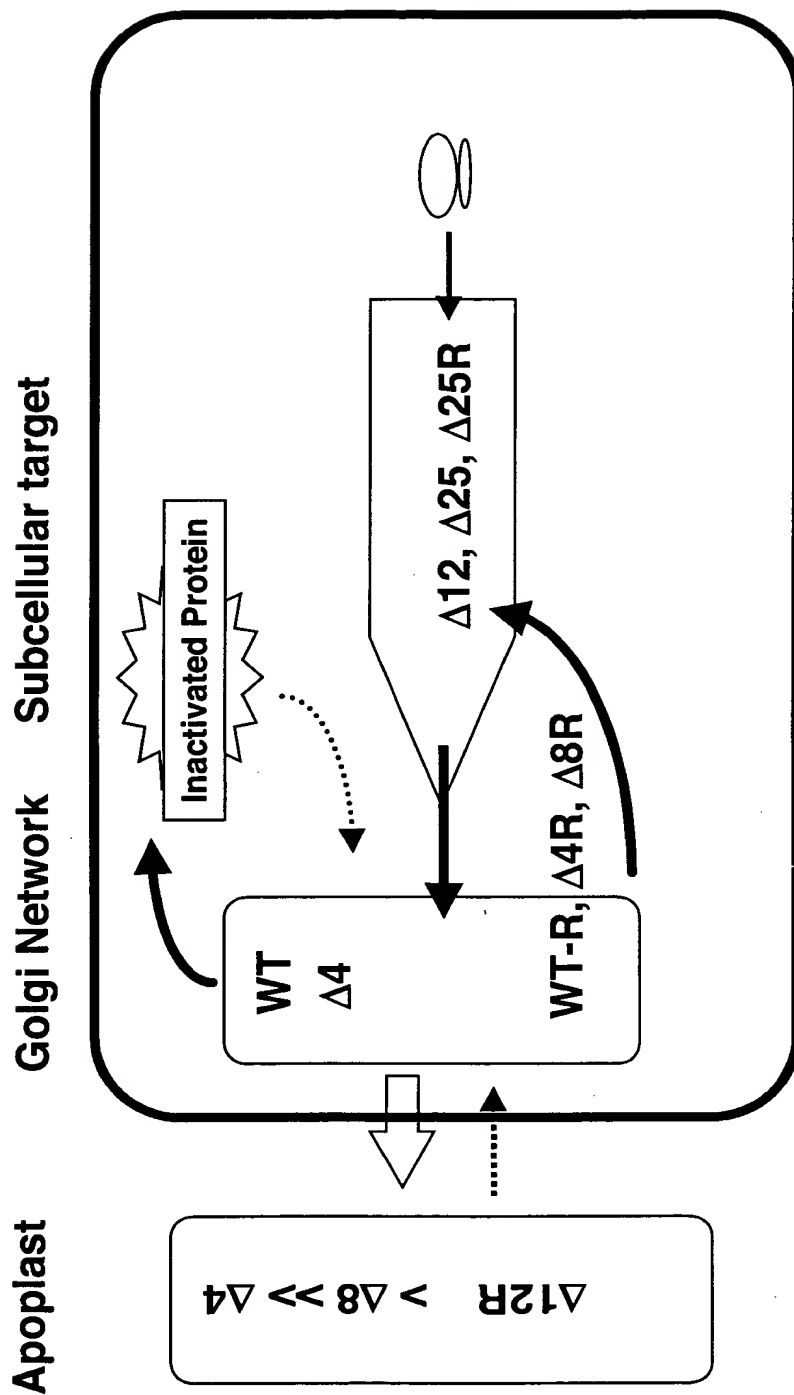


FIG. 10

100-100-100-100

FIG. 11

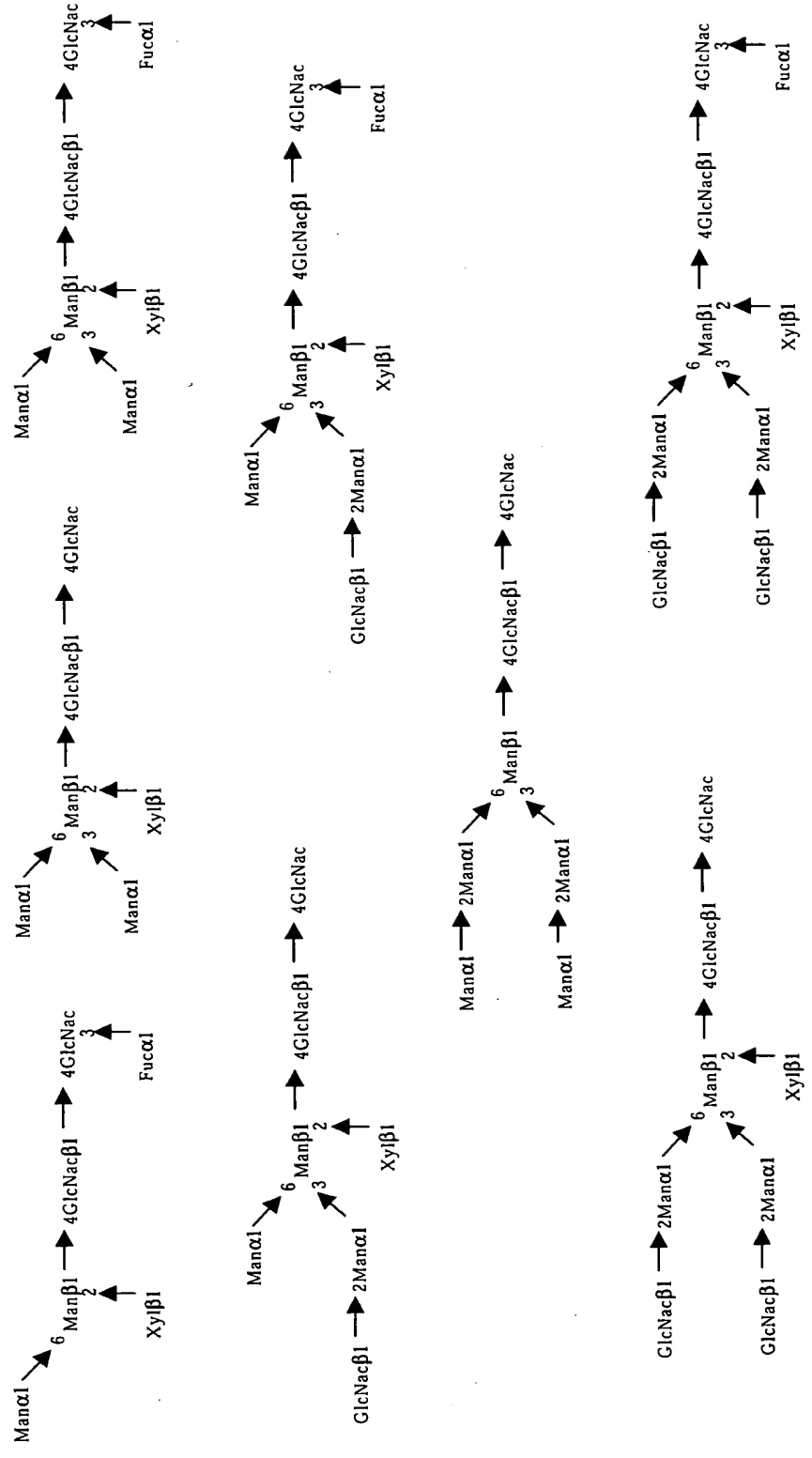


FIG. 12-1

[illegible]

CAATCTCAGAATGAATCCACTGTGCGAGTAGAATACGAGATCTGGCGAAGATTGGGTTTGAAGACTTCTTGGGAGAAAG  
TTTGAAACAAGGGCATAGAAAGACCACCCTCAAGGATTATACCGCAGGTATAAAAAATTGCATCTGGTATCAAAGAAAG  
AGCGGGGACGTACGACGTTTCATTGAAACACTGTGATCATTGCTGCATGTTTGGCCTCGATGCTCCGATGGAGAAAAAT  
AATCAAAGGAGCCTTTTGGGTGACGATAGTCTGCTGTACTTTCCAAAGGGTTGTGAGTTTCCGGATGTGCAACACTCCG  
CGAATCTTATGTGGAATTTTGAAGCAAAACTGTTTAAAAAACAGTATGGATACTTTTGGCGAAGATATGTAATACATCAC  
GACAGAGGATGCATTGTGTATTACGATCCCTAAAGTTGATCTCGAAAATTGGTGCTAAACACATCAAGGATTGGGAACA  
CTTGGAGGAGTTTCAAGAGGTCTCTTTGTGATGTTGCTGTTTCGTTGAACAAATTGTGCGGTATTACACACAGTTGGACGACG  
CTGTATGGGAGGTTTATAAGACCGCCCCCTCCAGGTTCTGTTTGTATATAAAAGTCTGGTGAAAGTATTTGTCTGATAAAGTT  
CTTTTTAGAAGTTTGTATTATAGATGGCTCTAGTTGTTAAAGGAAAAAGTGAATATCAATGAGTTTATCGACCTGACAAAAA  
TGGAGAAGATCTTACCCTCGATGTTTACCCTGTAAAGAGTGTTATGTGTTCCAAAGTTGATAAAAAATATGGTTCATGAA  
AATGAGTCATTGTACAGAGGTGAACCTTCTTAAAGGAGTTAAGCTTATTGATAGTGGATACGCTCTGTTTAGCCGGTTTGGT  
CGTCACGGGGCAGCTGGAATTTGCCTGACAAATTGCAGAGGAGGCTGTGACGCTGTCTGTGGACAAAAGGATGGAAAGAG  
CCGACAGGCCCACTCTCGGATTCTTACTACACAGCAGCAGTCAAGAAGAAAAAGTTTCAGTTTCAAGGCTCTTCCCAATTATGCT  
ATAACCAACCCAGGACGCGATGAAAAACGTCGTGGCAAGTTTATGTTAATAATTAGAAATGTGAAGATGTCAGCGGGTTTCTG  
TCCGCTTTCTCTGGAGTTTGTGTGCGGTGTGATTGTTTATAGAAATAATATAAAAAATTAGGTTTGAGAGAGAAGATTACAA  
ACGTGAGAGACGGAGGGCCCCATGGAACCTTACAGAAGAAGTCGTTGATGAGTTTCATGGAAGATGTCCTATGTCGATCAGG  
CTTGCAAAGTTTTCGATCTCGAACCAGAAAAAGAGTGATGTCCGCAAGGGAAAAATAGTAGTAATGATCGGTCAGTGCC  
GAACAAGAACTATAGAAATGTTAAGGATTTTGGAGGAATGAGTTTTAAAAAGAATAATTTAATCGATGATGATTGCGGAGG  
CTACTGTGCGCCGAATCGGATTCGTTTTAAATAGATCTTACAGTATCACTACTCCATCTCAGTTTCGTGTTCTTGTCTATTAA  
TATGCAGGTGCTGAACACCATCGTGAAACAAACACTTCTGTGCCCTTTCGGTCCCTCATCGTCTCCTTGGCCCTCTCCTCCA  
ACTTGACAGCCGGCATGCTGGACAATGGATTGGCAAGGACGCCTACCATGGGCTGGCTGCACTGGGAGCGCTTCATGTGC  
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AGGCTGGAAGGATGCAGGTTATGAGTACCTCTGCATTGATGACTGTTGGATGGCTCCCCAAAGAGATTGAGAAGGCAGAC  
TTCAGGCAGACCCTCAGCGCTTTCCTCATGGGATTCGCCAGTACTGTAATTTATGTTACAGCAAAAGGACTGAAGCTAGGG  
ATTTATGTCAGATGTGGAAATAAAAACCTGCGCAGGCTCCCTGGGAGTTTTGGATACTACGACATTCGATGCCAGACCTT  
TGCTGACTGGGGAGTAGACTCTCTAAAAATTTGATGTTGTTGTTACTGTGACAGTTTGGAAAAATTTGGCAGATGGTTATAAGC  
ACATGTCCTTGGCCCTGAATAGGACTGGCAGAAGCATTGTGTACTCCTGTGAGTGCCCTCTTTATATGTGGCCCTTTCAA  
AAGCCCAATTATACAGAAATCCGACAGTACTGCAATCACTGGCGAAATTTTGTGACATTGATGATTCTCGAAAAAGTAT  
AAAGAGTATCTTGGACTGGACATCTTTTAAACCAGGAGAGAATTGTTGATGTTGCTGGACCAGGGGGTTGGAATGACCCAG  
ATATGTTAGTGATTGGCACTTTGGCCTCAGCTGGAATCAGCAAGTAACTCAGATGGCCCTCTGGGCTATCATGGCTGCT  
CCTTTATTATGCTAATGACCTCCGACACATCAGCCCTCAAGCCAAAGCTCTCCTTCAGGATAAGGACGTAATTGCCAT  
CAATCAGGACCCCTTGGGCAAGCAAGGGTACCAGCTTAGACAGGGAGACAACCTTTGAAGTGTGGGAACGACCTCTCTCAG  
GCTTAGCCTTGGGCTGTAGCTATGATAAACCCGGCAGGAGATTGGTGGACCTCGCTCTTATACCATCGCAGTTGCTTCCCTG  
GGTAAAGGAGTGGCCTGTAATCCTGCCTGCTTCATCACACAGCTCCTCCCTGTGAAAAGGAAGCTAGGGTTCTATGAATG  
GACTTCAAGGTTAAGAAGTCACATAAATCCACAGGCACTGTTTTGCTTCAGTATctgaaaaggacgaattatgaCCTA  
GGCTCGCAAAGTTTCGAACCAAAATCCTCAAAAAGAGGTCCGAAAAATAATAAATTTAGGTAAAGGGCGTTACAGCGGA  
AGGCCATAAACCAAAAAAGTTTGTAGAGTTGAAAAGAGATTGTGATAATTTGATTGAAGATGAAGCCGACAGCTGCGCTCGC  
GGATTCTGATTGCTTAAATATGTCTTACTCAATCACTTCTCAGTACGAAATTTGTGTTTTGTCTATCTGTATGGCTGTGA  
CCCTATAGAATTGTTAAACGTTTGTACAAATTCGTTAGGTAACCAAGTTTCAAACACAGCAAGCAAGAACTACTGTTCAAC  
AGCAGTTTACGCGAGGTGTGGAACCTTTCCCTCAGAGCACCGTCAGATTTCTGCGCATGTTTATAAGGTGTACAGGTAC  
AATGCAGTTTTAGATCCTCTAATTACTGCGTTGCTGGGGGCTTTTGATACTAGGAATAGAATAATCGAAGTAGAAAAACA  
GCAGAGTCCGACAACAGCTGAAACGTTAGATGCTACCCGAGGGTAGACGACGCTACGGTTGCAATTCGGTCTGCTATAA  
ATAATTTAGTTAATGAAGTGTAGAGGTAAGGTAAGGTAAGGTAAGGTAAGGTAAGGTAAGGTAAGGTAAGGTAAGGTAAGG  
ACCTCTGCACCTGCATCTTAAATGCATAGGTGCTGAAATATAAAGTTTGTGTTTCTAAAAACACAGTGGTACGTACGATA  
ACGTACAGTGTTTTTCCCTCCACTTAAATCGAAGGGTAGTGCTTGAGAGCGCGCGGAGTAAACATATATGGTTTCATATAT  
GTCCGTAGGCACGTAAAAAAAGCGAGGGATTGCAATTCCTCCCGGAACCCCGGTTGGGGCCAGGTACCAATTCCTGAAG  
ACGAAAGGGCCTCGTGATACGCCTATTTTTATAGGTTAATGTATGATAATAATGTTTCTTAGACGTCAGGTGGCACTT  
TTCGGGGAAATGTGCGCGGAACCCCTATTTGTTTATTTTCTAAATACATTCAAATATGTATCCGCTCATGAGACAATAA  
CCCTGATAAATGCTTCAATAATATTGAAAAAGGAAGAGTATGAGTATTCAACATTTCCGTGTGCGCCTTATTCCTTTTT  
TGGCGGATTTTGCCCTTCTGTTTTTGTCTACCCAGAAAACGCTGGTGAAGAGTAAAGAGTCTGAAGATCAGTTGGGTGCAC  
GAGTGGGTTACATCGAATCGGATCTCAACAGCGGTAAAGATCCTTGAGAGTTTTCGCCCGGAAGAACGTTTCCCAATGATG  
AGCACTTTTAAAGTTTCTGCTATGTGCGCGGTATTATCCCGTGTTGACGCGCGGAAGAGCAACTCGGTGCGCGCATACA  
CTATTCTCAGAATGACTTGGTTGAGTACTACCAGTTCACAGAAAAGCATCTTACGGATGGCATGACAGTAAGAGAAATTAT

FIG. 12-3

GATATTTTACAAACAATTACCAACAACAACAACAACAGACAACATTACAATTACTATTTACAATTACAATGGCATACACA  
CAGACAGCTACCACATCAGCTTTTGTCTGGACACTGTCCGAGGAAACAACCTCCTTGGTCAATGATCTAGCAAAGCGTCGTCT  
TTACGACACAGCGGTTGAAGAGTTTAACGCTCGTGACCGCAGGCCAAGGTGAACTTTTCAAAAGTAATAAGCGAGGAGC  
AGACGCTTATTGCTACCCGGGCGTATCCAGAATTCCAAATTACATTTTATAACACGCAAAATGCCGTGCATTGCGTTGCA  
GGTGGATTGGGATCTTTAGAAGTGAATATCTGATGATGCAAAATCCCTACGGATCATTGACTTATGACATAGCGGGGAA  
TTTTGCATCGCATCTGTTCAAGGACGAGCATATGTACACTGCTGCATGCCAACCTGGACGTTTCGAGACATCATCGGC  
ACGAAGGCCAGAAAGACAGTATTGAACTATACCTTTCTAGGCTAGAGAGAGGGGGGAAAAAGTCCCCAACTTCCAAAAG  
GAAGCATTGACAGATACGCAGAAATTCCTGAAGACGCTGTCTGTCAAACTTTCCAGACATGCGAACATCAGCCGAT  
GCAGCAATCAGGCAGAGTGTATGCCATTGCCGTACACAGCATATATGACATACCAGCCGATGAGTTCGGGGCGGCACTG  
TGAGGAAAAATGTCCATACGTGCTATGCCGCTTTCCACTTCTCCGAGAACCTGCTTCTTGAAGATTTCATGCGTCAATTTG  
GACGAAATCAACGCGTGTTTTTTCGCGCGATGGAGACAAGTTGACCTTTTCTTTTGCATCAGAGAGTTACTTAAATTACTG  
TCATAGTTTATTCTAATATTCTTAAGTATGTGTGCAAACTTACTTCCCGGCTCTAATAGAGAGGTTTACATGAGGAGT  
TTTTAGTACCAGAGTTAATACCTGCTTTTTGTAAAGTTTCTAGATAAGTACTTTTTCTTTGTACAAAGGTGTGGCCCAT  
AAAAGTGTAGATAGTGAGCAGTTTTATACCTGAATGGAAGACGCATGGCATTACAAAAAGACTCTTGAATGTGCAACAG  
CGAGAGAATCCTCCTTGGGGATTTCATCATCAGTCAATTAAGTGTGTTCCAAAAATGAGGGATATGGTCATCGTACCATTAT  
TCGACATTTCTTTGGAGACTAGTAAGAGGACGCGCAAGGAAGTCTTAGTGTCCAAGGATTTGCTGTTACAGTGCCTAAC  
CACATTCGAACATACCAGGCGAAAGCTCTTACATACGCAAAATGTTTTGCTTTCGTGCAATCGATTTCGATCGAGGGTAAT  
CATTAAACGGTGTGACAGCGAGGTCCGAATGGGATGTGGACAAATCTTTGTTACAATCCTTGTCCATGACGTTTTACCTGC  
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TGGGATGAGATTTGCTGTGGCGTTTGGGAACGCATTTCCCTCCGTGAAAGAGAGGCTCTTGAACAGGAAACTTATCAGAGT  
GGCAGGCGACGCATTAGAGATCAGGGTGCCTGATCTATATGTGACCTTCCACGACAGATTAGTGACTGAGTACAAGGCCT  
CTGTGGACATGCCTGCGCTTGACATTAGGAAGAAGATGGAAGAAACGGAAGTATGTACAATGCATTTTCAAAATTATCG  
GTGTTAAGGGAGTCTGACAAATTCGATGTTGATGTTTTTTCCAGATGTGCCAATCTTTGGAAGTTGACCCAATGACGGC  
AGCGAAGGTTATAGTCGCGGTTCATGAGCAATGAGAGCGGTCTGACTCTCACATTTGAACGACCTACTGAGGCGAATGTTG  
CGTGACTTTTACAGGATCAAGAGAAGGCTTCAGAAGGTGCATTTGATGTACTTCAAGAGAAGTTGAAGAACCGTCCATG  
AAGGTTTCGATGGCCAGAGGAGACTTACAATTAGTCTGCTTGTGGAGATATCCGGAATCGTCTTATTTCAAGAACA  
GGAGATAGAGTCTTTAGAGCAGTTTCATATGGCGACGCGAGATTGCTTAATTCGTAAGCAGATGAGCTCGATTGTGTACA  
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GTCAAGATCCTCAAAGATACAGTGTCTATTGACCTTGAAACCCGTCAAAAGTTTGGAGTCTTGGATGTTGCATCTAGGAA  
GTGGTTAATCAAACCAACGGCCAAGAGTTCATGCATGGGGTGTGTTGTTGAAACCCACGCGAGGGAGTATCATGTGGCGTTTT  
TGAATATGATGAGCAGGGTGTGGTGACATGCGATGATTGGAGAAGAGTAGCTGTTAGCTCTGAGTCTGTTGTTTATTCC  
GACATGGCGAAACTCAGAACTCTGCGCAGACTGCTTTCGAAACGGAGAACCAGCATGTGAGTACGCGAAAGGTTGTTCTTGT  
GGACGGAGTTCCGGGCTGTGGAAAAACCAAAGAAATCTTTCCAGGGTTAATTTTGATGAAGATCTAATTTTAGTACCTG  
GGAAGCAAGCCGCGGAAATGATCAGAAGACGTGCGAATTCCTCAGGGATTATTGTGGCCACGAAGGACAACGTTAAAAAC  
GTTGATTTCTTTTCATGATGAATTTTGGGAAAAGCACACGCTGTGAGTTCAAGAGGTTATTTCATTGATGAAGGGTTGATGTT  
GCATACTGGTTGTGTTAATTTTCTTGTGGCGATGTCATTGTGCGAAATTCATATGTTTACGGAGACACACAGCAGATT  
CATACATCAATAGAGTTTCAGGATTCCCGTACCCCGCCCAATTTTGCCAAATGGAAGTTGACGAGGTGAGACAGCCGAGA  
ACTACTCTCCGTTTGCCAGCGATGTACACATTATGCAACAGGAGATAGAGGCTTTGTCATGAGCACTTCTCTCGGT  
TAAAAAGTCTGTTTCCGAGGAGATGTGTCGCGGAGCCGCGGTGATCAATCCGATCTCAAAACCCCTTGATGGCAAGATCC  
TGACTTTTACCAATCGGATAAAGAAGCTCTGCTTTCAAGAGGGTATTGAGATGTTTCACTGTGCATGAAGTGAAGGC  
GAGACATACTCTGATGTTTCACTAGTTAGGTTAACCCTACACCGGTCTCCATCATTGCAGGAGACAGCCACATGTTTT  
GGTCGATTGTCAAGGCACACCTGTTGCTCAAGTACTACACTGTTGTTATGGATCCTTTAGTTAGTATCATTAGAGATC  
TAGAGAACTTAGCTCGTACTTGTAGATATGTATAAGGTGCGATGCAGGAACACAATAGCAATTACAGATTGACTCGGTG  
TTCAAAGGTTCCAATCTTTTTGTTGTCAGCGCCAAAGACTGGTGATATTTCTGATATGCAGTTTACTATGATAAGTGTCT  
CCCAGGCAACAGCACCATGATGAATAATTTTGATGCTGTTACCATGAGGTTGACTGACATTTTCATTGAAATGTCAAAGATT  
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GAAATGCCACGCCAGACTGGACTATTGAAAAATTTAGTGGCGATGATTAAGAAAACTTTAACGCACCCGAGTTGTCTGG  
CATCATTGATATTGAAAAACTGTCATCTTTGGTTGTAGATAAGTTTTTTGATAGTTATTTGCTTAAAGAAAAAAGAAAAAC  
CAAATAAAAAATGTTTCTTTGTTTCAGTAGAGAGTCTCTCAATAGATGGTTAGAAAAAGCAGGAACAGGTAACAATAGGCCAG  
CTCGCAGATTTTGATTTTGTGGATTGCGCAGCATGTGATCAGACACATGATTAAAGCACAACCCAAACAAAAGTT  
GGACACTTCAATGCAAAACGGAGTACCCGGCTTTGTCAGAGCATGTGTACCTTCAAAAAAGATCAATGCAATATTGCGGC  
CGTTGTTTAGTGAGCTTACTAGGCAATTACTGGACAGTGTGATTTCGAGCAGATTTTTGTTTTTCAAGAAGAACACCA  
CGCAGATTGAGGATTTCTTTCGGAGATCTCGACAGTCATGTGCCGATGGATGTCTTGGAGCTGGATATATCAAAATACG

FIG. 13-2



## TRANSGENIC VECTOR FOR rGCB EXPRESSION

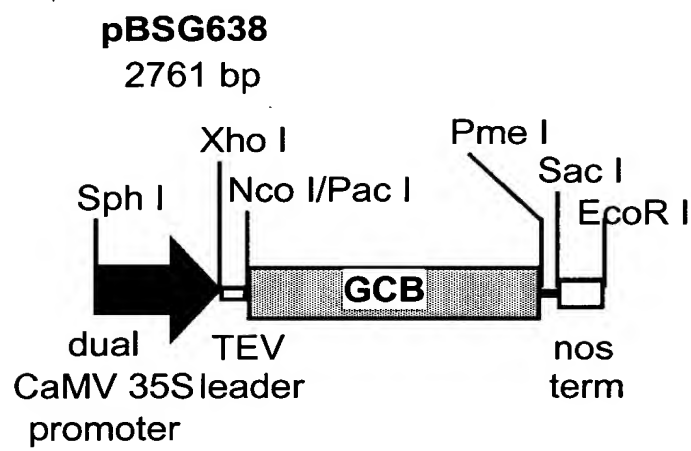


FIG. 14

